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Higley et al.

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(54) **SOFT-TACK, POROUS SUBSTRATES FOR HARVESTING SKIN GRAFTS**

(71) Applicant: **KCI Licensing, Inc.**, San Antonio, TX (US)

(72) Inventors: **Kevin Higley**, San Antonio, TX (US); **Bradley Jonietz**, San Antonio, TX (US); **T. Blane Sanders**, San Antonio, TX (US)

(73) Assignee: **KCI LICENSING, INC.**, San Antonio, TX (US)

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(52) **U.S. Cl.**
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CPC A61L 27/18; A61L 15/24; A61L 15/26; A61L 15/60; A61L 27/56; A61L 31/08;
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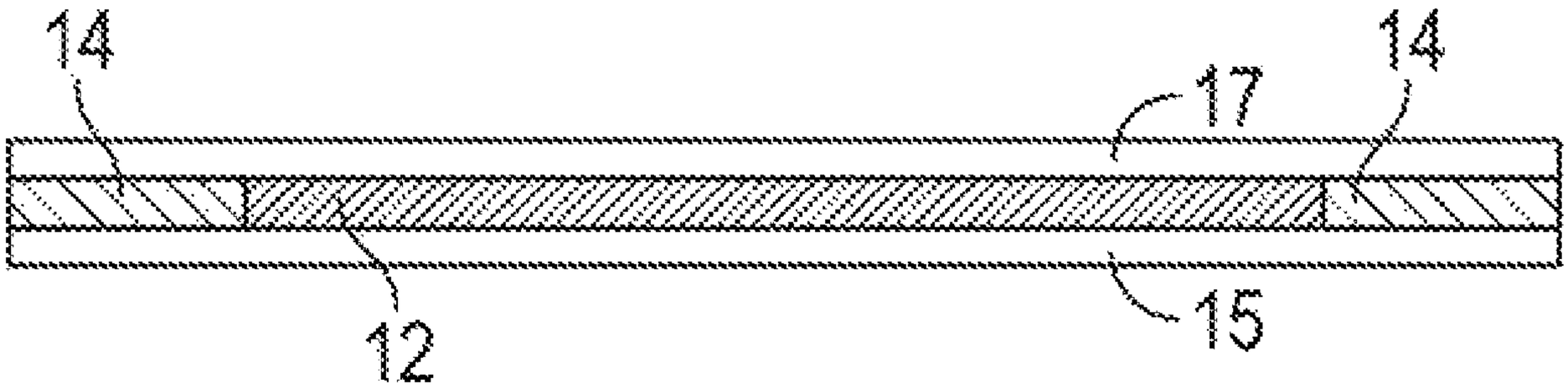
Primary Examiner — George J Ulsh
(74) *Attorney, Agent, or Firm* — Foley & Lardner LLP

(57) **ABSTRACT**

Devices and methods for skin graft harvesting are disclosed. In one aspect of the invention, substrates for transplanting skin grafts are disclosed that include a soft-tack, biocompatible composition having a surface adapted to contact at least one excised skin graft and engage the graft for removal from a donor site. In another aspect of the invention, at least a portion of the skin-contacting surface of the substrate (or dressing) is porous to facilitate fluid transport into (or out of) the graft site during harvesting and/or transplantation. The substrates can also incorporate an absorbent component to capture fluids. The substrate can be a mesh or fabric or web, e.g. woven, knitted, nonwoven or molded. The substrate can be a mesh of biocompatible fibers, for example, cellulosic, polyolefins, polyurethanes, polyesters or polyamide fibers. In one embodiment the mesh is formed of cellulose acetate fibers and coated with a silicone gel, to imparted the desire degree of tackiness.

16 Claims, 6 Drawing Sheets



(51) **Int. Cl.**

A61L 31/08	(2006.01)
A61L 31/14	(2006.01)
A61L 15/24	(2006.01)
A61L 15/26	(2006.01)
A61L 15/60	(2006.01)
A61L 27/56	(2006.01)

(52) **U.S. Cl.**

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(58) **Field of Classification Search**

CPC A61L 31/146; A61B 17/322; A61B 2017/3225

See application file for complete search history.

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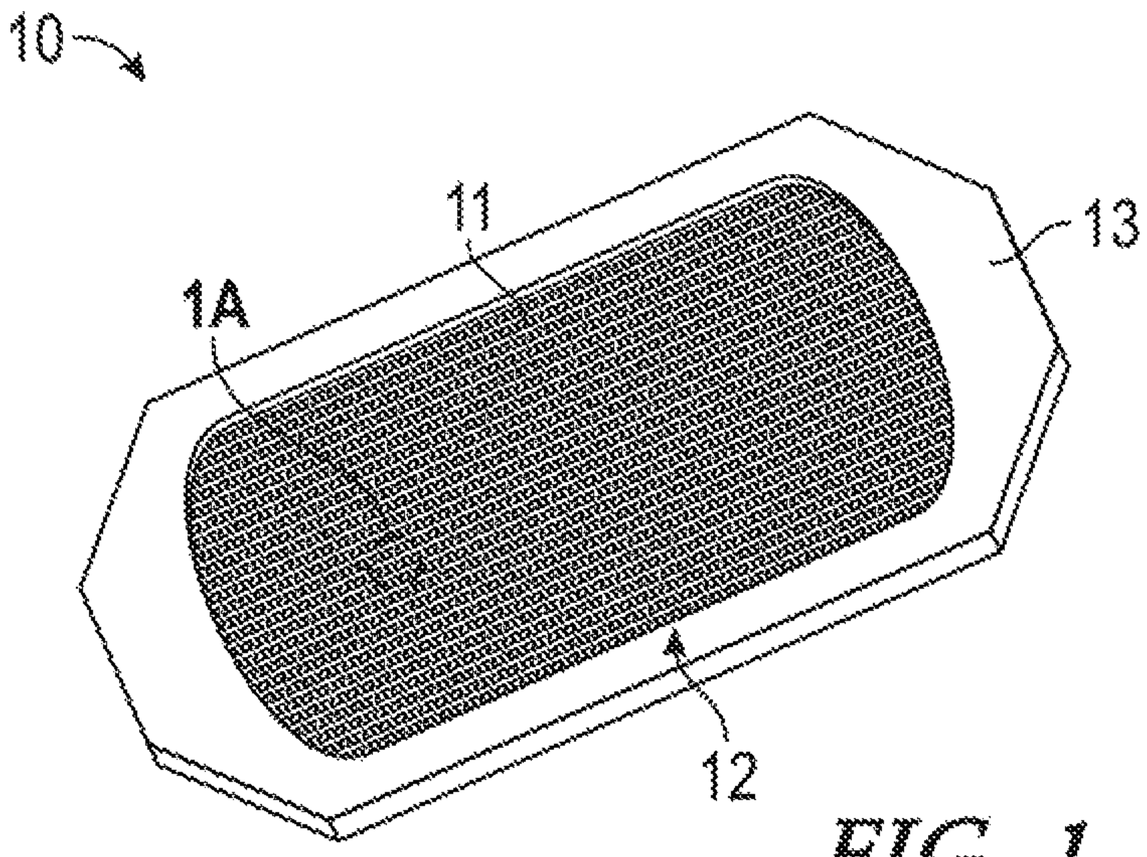


FIG. 1

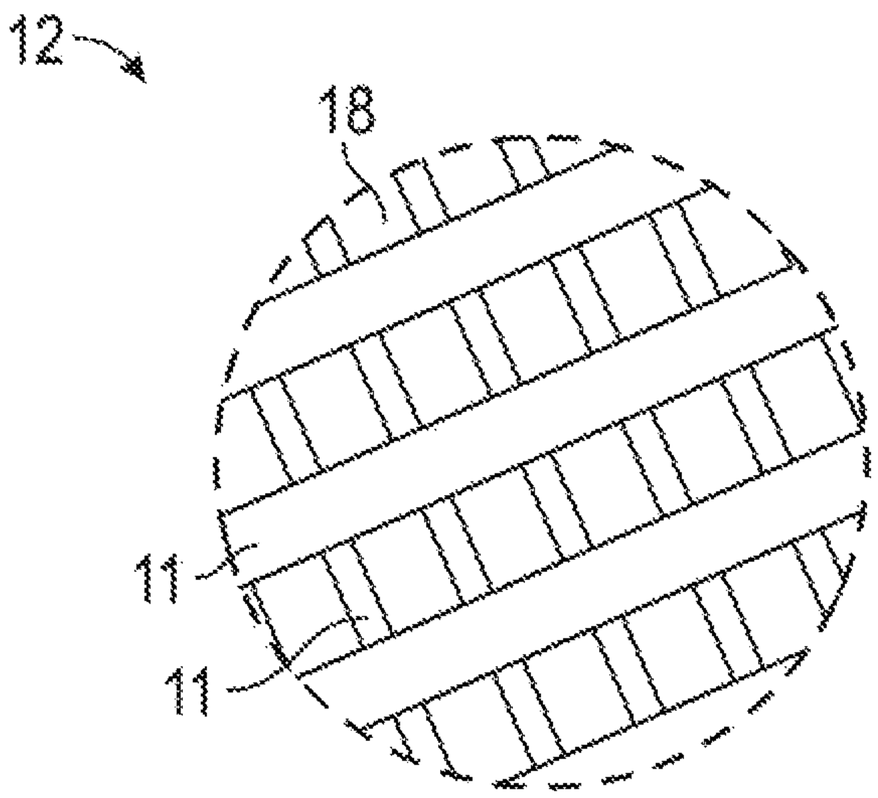


FIG. 1A

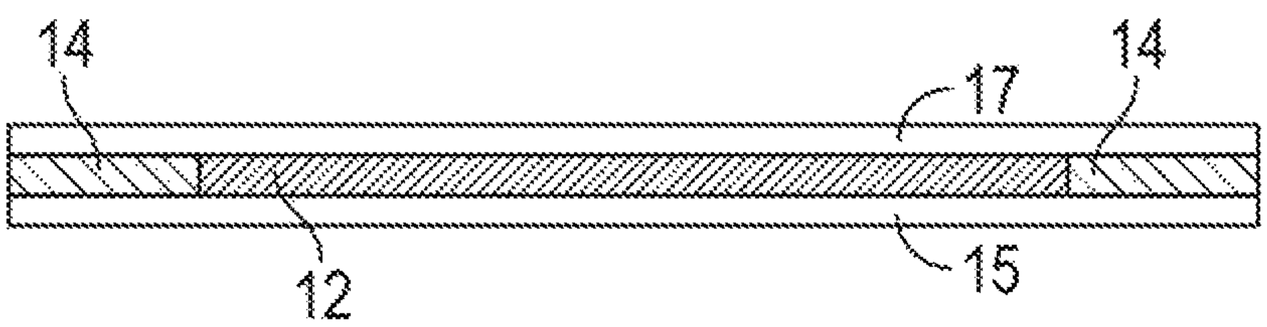
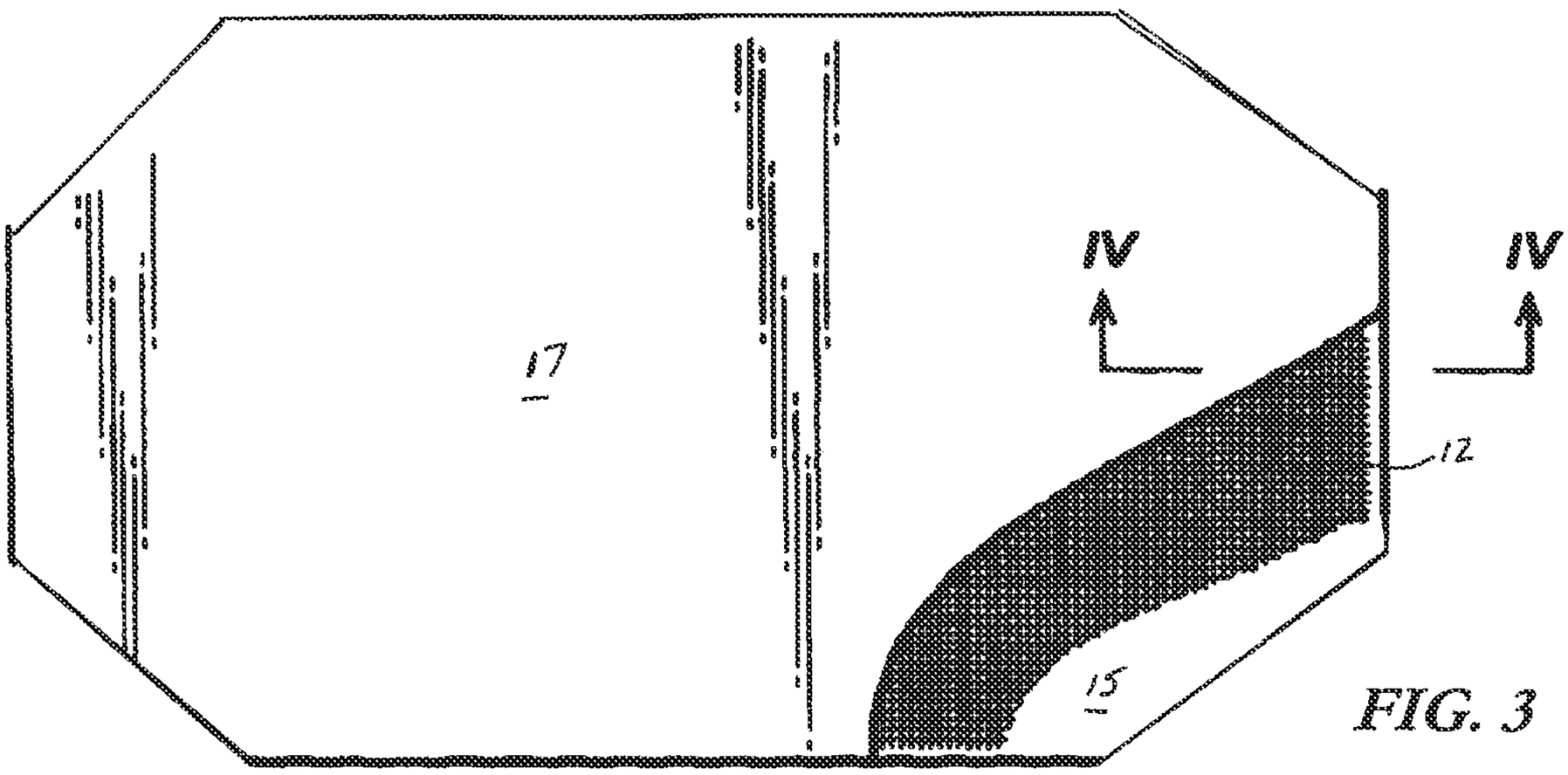


FIG. 2



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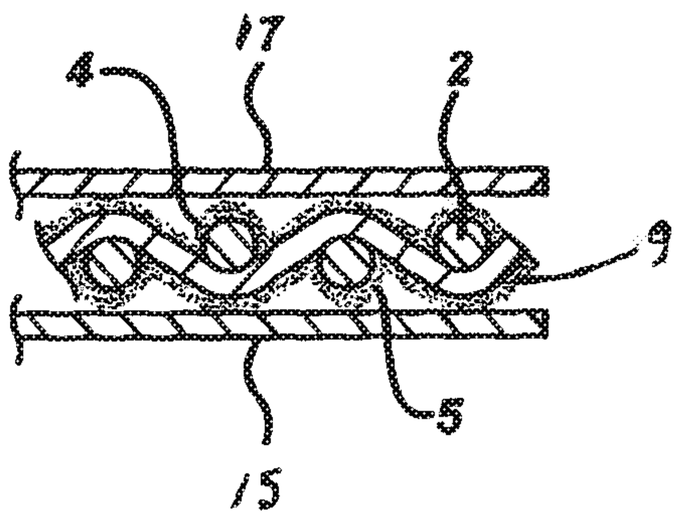
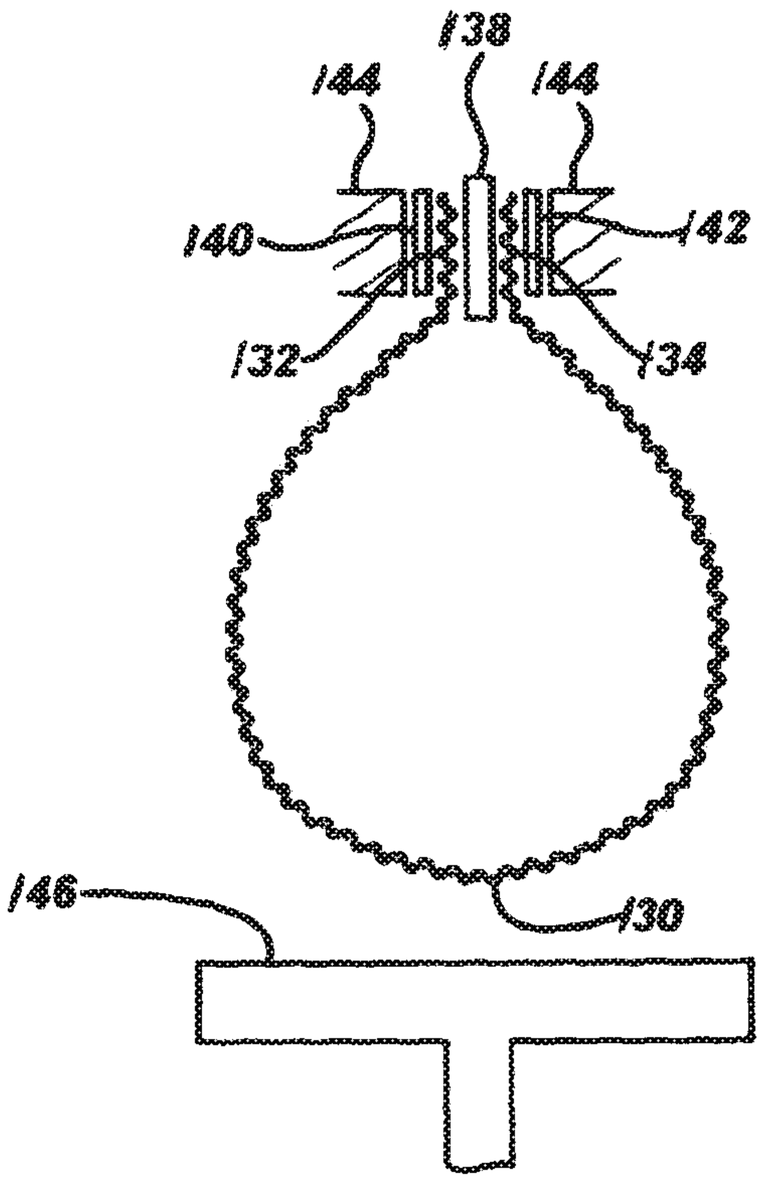


FIG. 4



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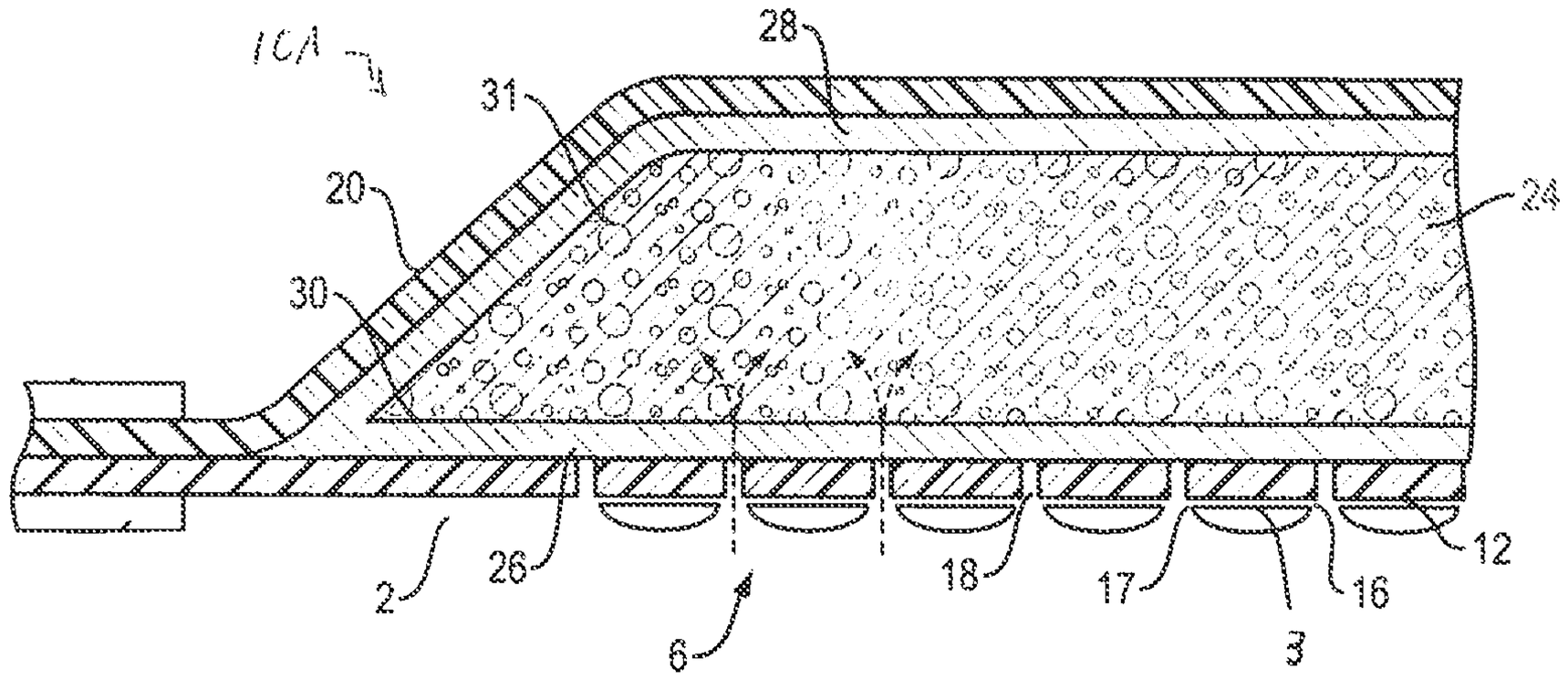
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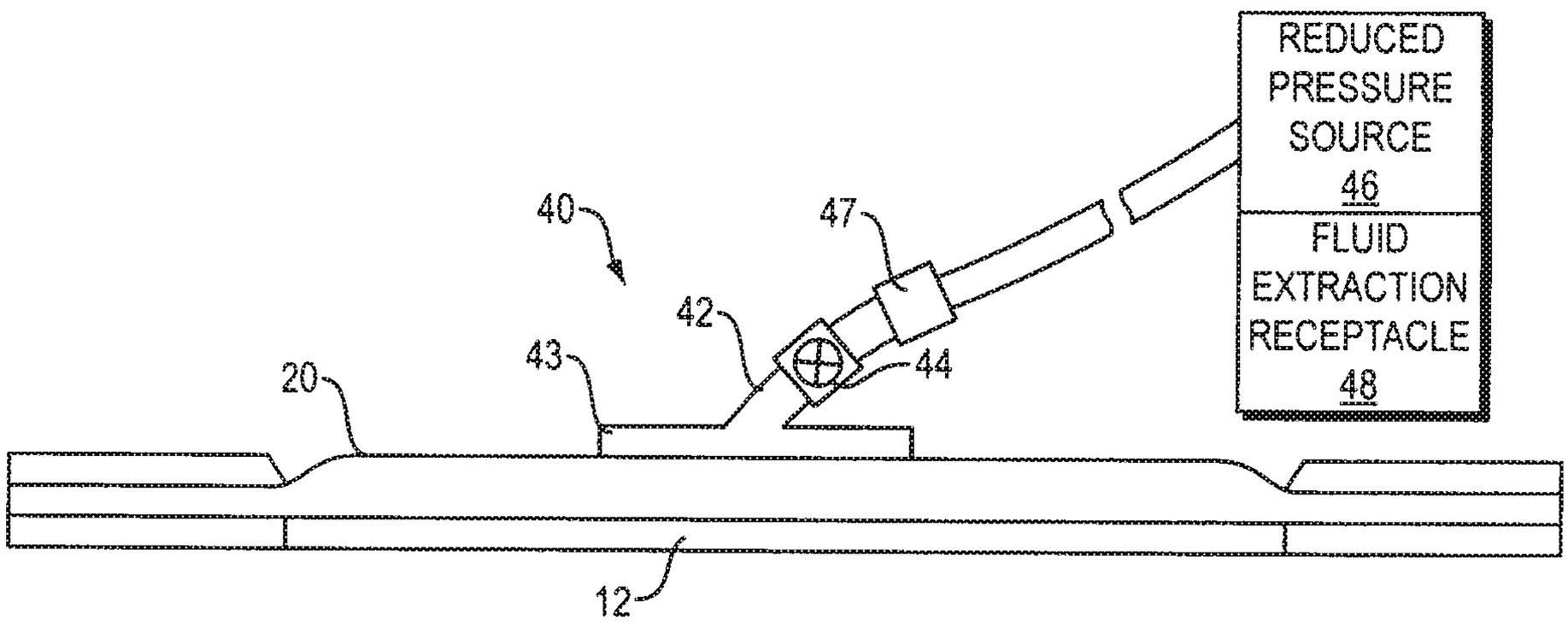
FIG. 6A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FLUID EXTRACTION RECEPTACLE
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FIG. 6B

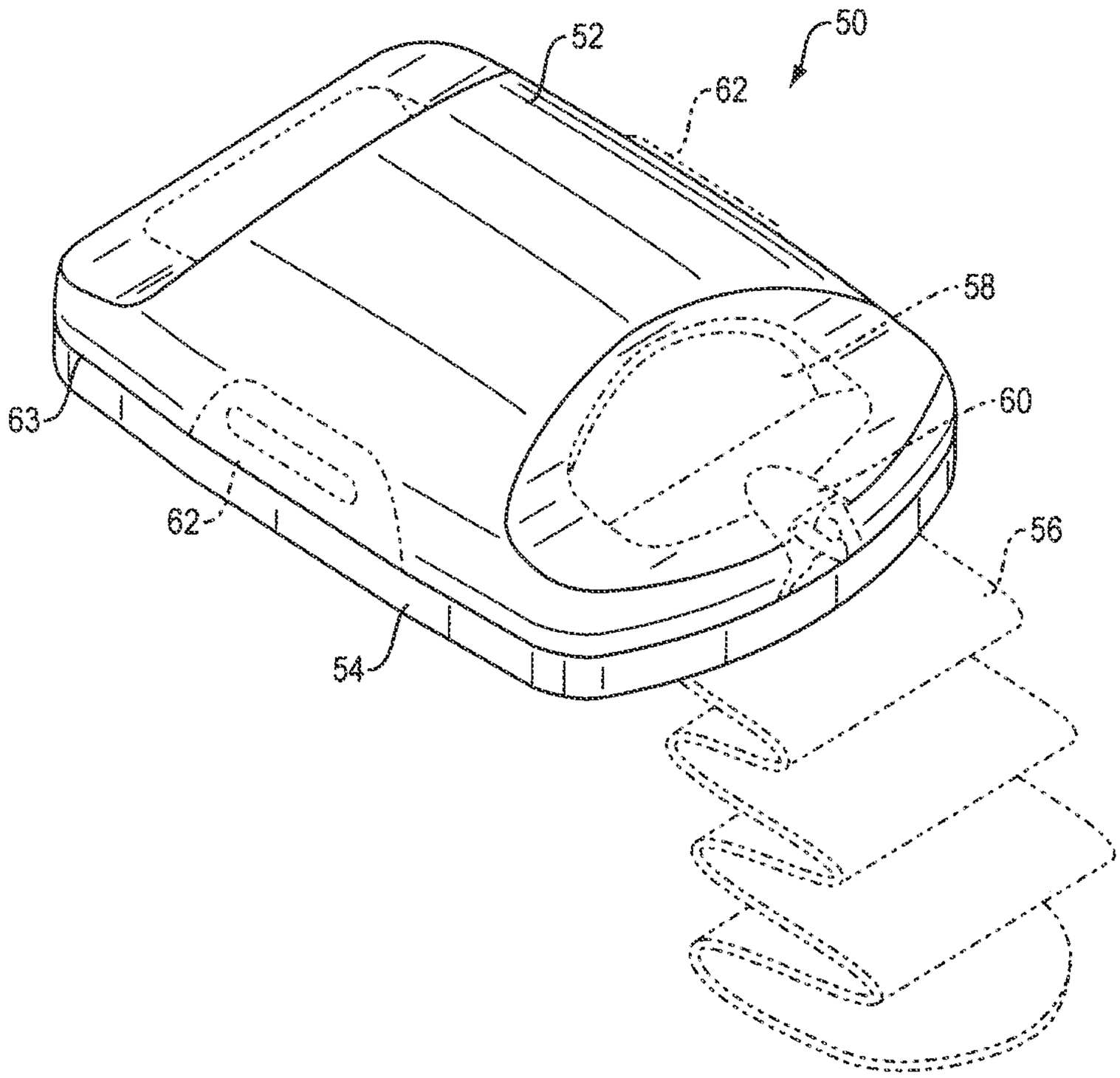

FIG. 7

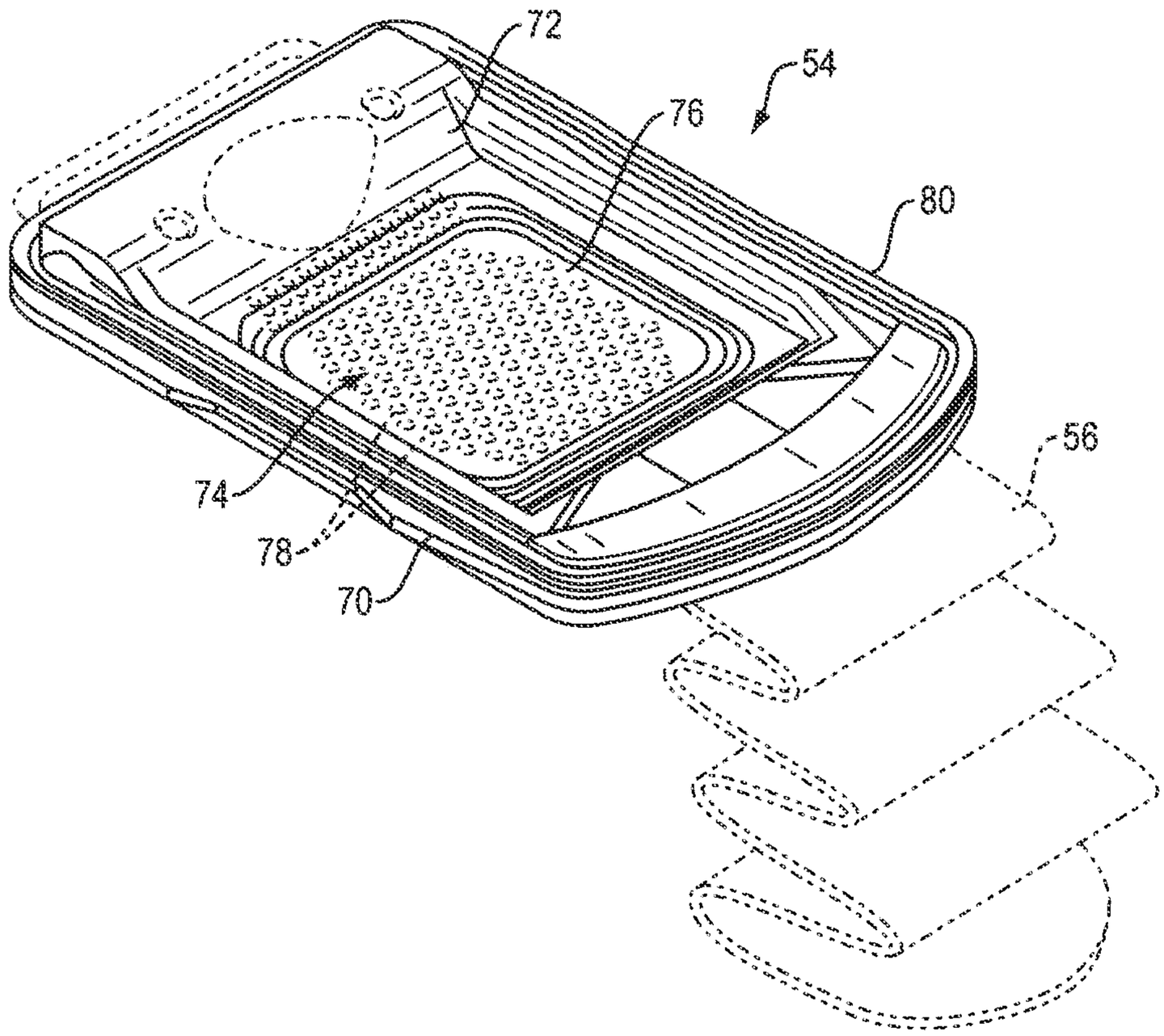

FIG. 8

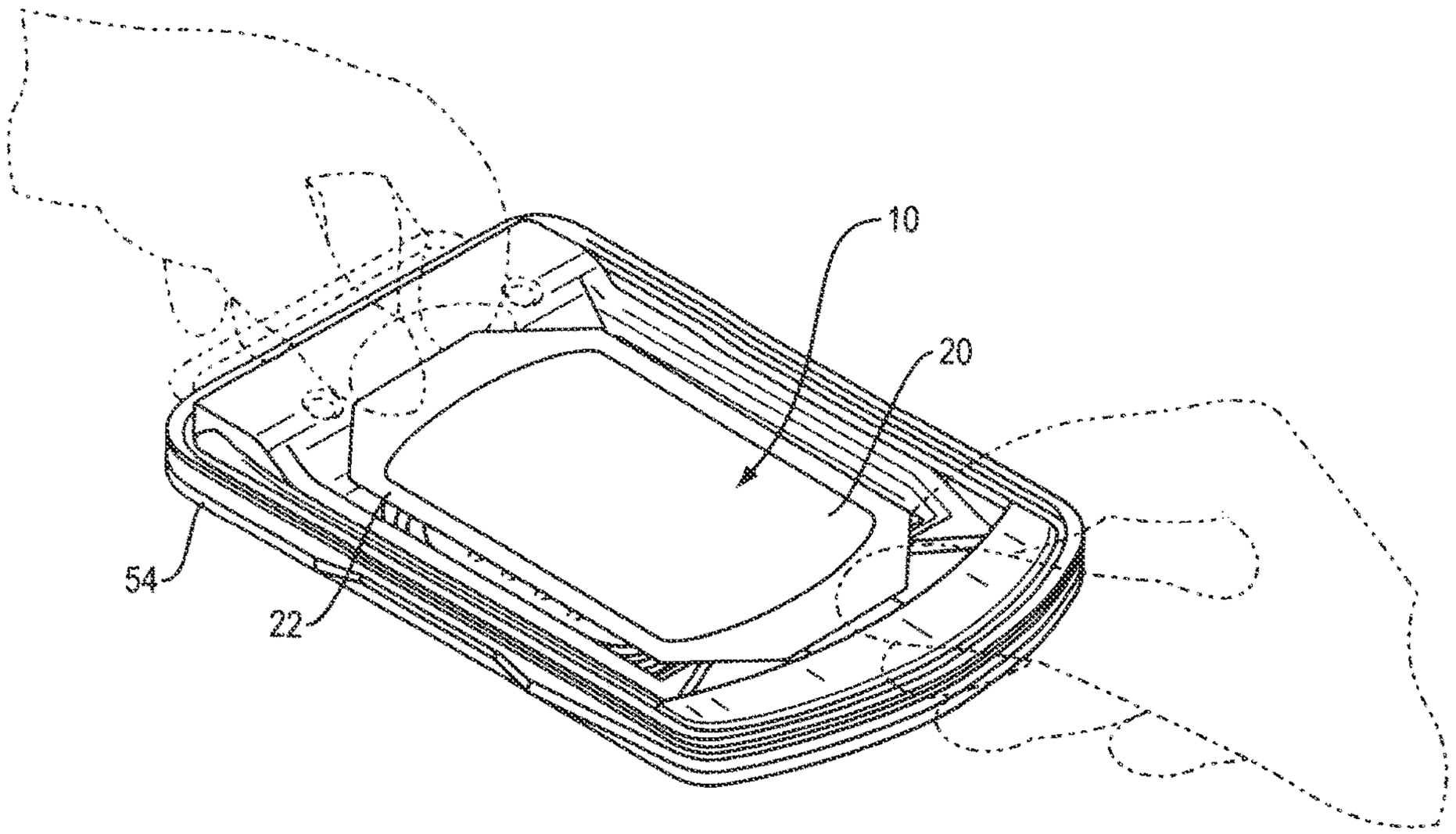

FIG. 9

SOFT-TACK, POROUS SUBSTRATES FOR HARVESTING SKIN GRAFTS

CROSS-REFERENCE AND RELATED APPLICATIONS

This application claims benefit of U.S. Provisional Patent Application Ser. No. 62/145,342 filed Apr. 9, 2015, which is incorporated herein by reference in its entirety.

FIELD

The present invention relates generally to medical treatments and, more particularly, but not by way of limitation, to apparatus, systems, and methods for harvesting and transplanting skin grafts.

BACKGROUND

Skin is the largest organ of the human body, representing approximately 16% of a person's total body weight. Because it interfaces with the environment, skin has an important function in body defense, acting as an anatomical barrier from pathogens and other environmental substances. Skin also provides a semi-permeable barrier that prevents excessive fluid loss while ensuring that essential nutrients are not washed out of the body. Other functions of skin include insulation, temperature regulation, and sensation. Skin tissue may be subject to many forms of damage, including burns, trauma, disease, and depigmentation.

Skin grafts are often used to repair such skin damage. Skin grafting is a surgical procedure in which a section of skin is removed from one area of a person's body (autograft), removed from another human source (allograft), or removed from another animal (xenograft), and transplanted to a recipient site of a patient, such as a wound site. As with any surgical procedure, skin grafting involves certain risks. Complications may include graft failure, rejection of the skin graft, bleeding, fluid accumulation or infection at either the donor or recipient site. Additionally, when an autograft is taken from one area of a person's body to produce the graft, some degree of trauma occurs at the donor site. If the recipient site is a large wound or otherwise damaged skin region, the trauma at the donor site can be significant.

Techniques have been developed for harvesting a large number of smaller grafts, e.g., so-called micrografts, to reduce the trauma at the donor site. By removing only a fraction of the skin at a donor site and leaving regions of healthy skin surrounding the excised regions, a large amount of skin for transplantation can be obtained with less discomfort. Micrograft harvesting can also reduce the healing time and risk of infection.

Harvesting of skin grafts can be accomplished in many different ways. One common technique for harvesting a skin graft involves the application of suction to separate a surface portion of the skin, e.g., the epidermis and a basal cell layer, from the underlying dermis. Harvesting of suction blisters typically also involves a heat source to facilitate blister formation.

Various devices are available for generating and harvesting micrografts. For example, the CelluTome® skin harvester is available from Acelity, Inc. of San Antonio, Tex. The CelluTome® system includes a head that provides a source of reduced pressure (vacuum), and optionally a heater element, and a harvester configured for placement on a target region of a patient's skin. The harvester is further adapted to form a sealing engagement with the head such that the target region of skin is embraced within an evacuated chamber. The CelluTome® harvester further includes at least one alignment plate having a plurality of holes through which skin blisters can be raised in the presence of negative pressure; and a cutting plate having at least one cutting surface for cleaving skin blisters after they are formed within the chamber.

Typically, micrograft harvesters rely upon a support or substrate to lift the excised blisters from the device. The substrate is then applied to a recipient site so that the plurality of micrografts can be assimilated as transplanted tissue. Ideally, the grafts will expand and coalesce to complete the healing process.

SUMMARY

Devices and methods for skin graft harvesting are disclosed. In one aspect of the invention, substrates for transplanting skin grafts are disclosed that include a soft-tack, biocompatible composition having a surface adapted to contact at least one excised skin graft and engage the graft for removal from a donor site. In another aspect of the invention, at least a portion of the skin-contacting surface of the substrate (or dressing) is porous to facilitate fluid transport into (or out of) the graft site during harvesting and/or transplantation.

In one embodiment of the invention, the transport substrate can be used in conjunction with a skin micrograft harvester, such as the CelluTome® harvester to capture and retain a plurality of skin micrografts (or "microdomes"). The invention can utilize a flexible mesh that is coated, for example, with silicone, e.g. a silicone gel. The soft silicone, although not an adhesive, has a soft tack which when pressed onto microdomes, allowing for the slight immersion of the top of the microdome into the silicone, enabling the microdomes to be lifted away from the harvester. Due to the soft tack, the dressing can be lifted and repositioned as required. If the dressing folds over onto itself, it can be easily unfolded for the application. The open areas of the dressing mesh is sufficient for passage of fluid through the open areas to a secondary absorbent dressing, but is tight enough to prevent the microdomes from falling through the open areas.

Soft tack, mesh or porous substrates has several advantages over solid adhesive films in harvesting micrographs. For example, the soft tack nature of the substrates of the present invention permit unfolding and repositioning. Moreover, solid substrates (typically non-porous acrylic films) are often ill-suited for wet environments and do not permit fluid passage.

The substrate can be a mesh or fabric or web, e.g. woven, knitted, nonwoven or molded. In certain embodiments the substrate can be a mesh of biocompatible fibers. The fibers, for example, can be cellulosic, polyolefins, polyurethanes, polyesters or polyamides. In one embodiment the mesh is formed of cellulose acetate fibers.

The meshes are typically coated, e.g., with a silicone gel, to impart the desire degree of tackiness. For example, silicone coating compositions can be formed using silicone elastomers available from Dow Corning under product reference Q7-9177. Additional details on applying silicone coatings can be found in U.S. Patent Application Pub. No. 2013/0165837 by Systagenix Wound Management IP Co. BV entitled "Silicone Gel-Coated Wound Dressings," published Jun. 27, 2013, herein incorporated in its entirety by reference.

Following coating, the substrates should remain porous, e.g., apertures should remain between the coated fibers or web. The "open area" of the coated substrate can range from 5% to 65%, more preferably in some instances from 10% to 50%. The average diameter of individual apertures or pores can range from 0.3 to 4 mm, more preferably in some instances from 0.5 to 2 mm. The apertures should be smaller enough that skin micrografts that contact the substrate cannot easily pass through the apertures.

In certain embodiments the substrate is a fabric such as a gauze, or a mesh, having an array of apertures. The size and shape of the apertures in the substrate are not critical, but the apertures should suitably be such as to ensure that the material can be adequately coated with silicone gel without them becoming occluded. The apertures generally have an aspect ratio of from 1:1 to 5:1, and preferably from 1:1 to 2:1. For example, the apertures may be approximately circular or approximately square. The apertures suitably have an average diameter of from 0.3 to 4 mm, and more suitably from 0.5 to 2 mm.

The substrate can be formed from any medically acceptable material, such as cellulose, polyolefins, polyesters, or polyamides. An especially suitable material is cellulose acetate gauze. Substrates having a weight of from 15 to 200 g/m^2 are generally found to be suitable for use in the products of the invention, and fabrics weighing from 50 to 150 g/m^2 are most suitable. For example, certain embodiments employ a fabric of from 80 to 120 g/m^2.

Suitably, the silicone-coated substrate product retains open apertures to allow passage of wound fluid through the coated substrate. For example, an array of apertures may extend through said silicone coatings and the substrate layer. The open area of the coated substrate in the final product can, for example, be from about 1% to about 70%, or from about 10% to about 50%.

The substrate materials of the invention are characterized by a tacky silicone coating on at least one surface the substrate, the surface that is intended to capture one or more harvested skin grafts. This surface is typically referred to herein as the lower surface. However, it will be appreciated by those skilled in the art that orientation is simply for convenience sake and that the actual orientation of the soft tack surface will depend upon the orientation of the skin graft harvester.

In certain applications it can be simpler to form a substrate having a soft-tack composition on both the lower and the opposing upper surfaces. The tackiness of the two surfaces can be same or different. For example, the upper surface can be formed so as to be less or more tacky. In other embodiments the upper surface can be further treated or further coated to render it substantially non-sticky or, as described further below, the upper surface can be joined to an absorbent material to remove fluids during a subsequent transplantation stage.

The total coating weight of the tacky silicone (combined upper and lower layers) is suitably from about 50 g/m^2 to about 500 g/m^2, for example from about 80 g/m^2 to about 200 g/m^2, typically from about 100 g/m^2 to about 150 g/m^2. The silicone is suitably a soft skin adhesive silicone composition. Suitably chemistry is described below. The silicone is suitably hydrophobic.

One or both surfaces can be protected before use by cover sheets adhered to the coating by the tackiness thereof. In certain embodiments, one cover sheet can be removed more easily than the other. For example, one can selectively remove the first cover sheet if it is less strongly adhered in order to attach the substrate to a harvester apparatus to capture micrografts. Following graft capture, then the second cover sheet with its more-adherent surface can be removed to expose the other surface for application of secondary dressing layers, such as absorbent layers prior to transplantation of the graft at a recipient site. In other embodiments, both the upper and lower protective covers can be removed before harvesting the grafts because the soft-tack compositions can be designed such that they do not wrinkle or bend when applied to the harvester apparatus, and can be easily unfolded if needed.

The products of the invention may be made into wound dressings for application to the surface of a wound by removing the top and bottom cover sheets. Suitably, the products of the invention consist essentially of the substrate, the silicone coatings, and the cover sheets. Suitably, the products of the invention are sterile and packaged in a microorganism-impermeable container.

In certain embodiments the substrate includes a patterned base or a peripheral rim configured for positioning the substrate in a chamber of a skin graft harvesting device and, optionally, the substrate is further configured to capture a plurality of skin grafts at the same time.

In certain embodiments, the substrate has an average thickness between about 50 microns and about 10 millimeters, preferably in some cases, between about 500 microns (μm) and about 1000 microns (μm). The substrate should also be flexible enough to conform to the shape of the harvester and/or the recipient site. For example, the substrate can have a stiffness between about 5 Shore OO and about 80 Shore OO.

In another aspect of the invention, methods of making a material for capturing harvested skin graft are disclosed including, for example, the steps of providing a substrate layer having an upper surface and a lower surface; coating said upper and lower surfaces of said substrate layer with a fluid silicone prepolymer composition; followed by thermally partially curing said silicone prepolymer composition to produce an intermediate material having a partially cured silicone composition on said upper and lower surfaces; followed by further curing said partially cured silicone composition by exposing said intermediate material to ionizing radiation, to produce a final material having tacky silicone coatings on said upper and lower surfaces

In certain embodiments it can be desirable to apply unequal weights of the silicone coating composition to the upper and lower surfaces, and/or to apply different amounts of heat to the upper and lower surfaces during curing, such that the silicone coatings on the upper and lower surfaces having different tackiness are formed.

In another aspect of the invention, methods of harvesting skin grafts are disclosed including the steps of placing a skin graft harvester at a donor site of a patient's skin, coupling the harvester to a source of reduced pressure such that the donor site of skin is embraced within an evacuated chamber and one or more blisters are raised through apertures in a cutter mechanism, placing a soft-tack, porous substrate having a surface adapted to couple with the cutter mechanism in contact the raised blister(s), actuating the cutter assembly to excise one or more blisters for use as skin grafts, and removing the substrate with the skin grafts attached thereto.

In yet another aspect of the invention, systems are disclosed that can include a soft-tack porous substrate and a disposable harvester head assembly that are provided separately or as a kit to facilitate skin harvesting. For example, the system can include a harvester head assembly configured for placement at a donor site of a patient's skin and further adapted for coupling to a source of reduced pressure such

that the donor site of skin is embraced within an evacuated chamber, the harvester further comprising a cutter mechanism for excising skin grafts that are raised by reducing the pressure within the chamber; and a soft-tack, porous substrate having a surface adapted to couple with the cutter mechanism to contact at least one excised skin graft and engage said graft for removal from the harvester.

In a further aspect of the invention, the soft-tack, porous substrates of the present invention can be used in conjunction with a secondary absorbent component when the micrografts are ready for transplantation. The secondary component can be a separate element or it can be integral with the substrate, e.g. present during harvesting. In according with this aspect of the invention, dressings for transplanting skin grafts are disclosed including a base layer comprising a soft-tack, porous material adapted to contact at least one excised skin graft and to engage said graft for removal from a donor site; a cap member peripherally joined to the base layer and defining an enclosure therebetween; and an absorbent material disposed within the enclosure; wherein at least a portion of the base layer is porous and in fluid communication with the absorbent layer to capture fluids. The base layer can be a substrate composition, e.g., a silicone coated gauze material, as described above.

More generally, the base layer of the absorbent dressing preferably includes a soft-tack, biocompatible material, e.g., a material selected from the group of silicones, silicone gels, soft silicones, hydrocolloids, hydrogels, polyurethanes, polyurethane gels, polyolefins, polyolefin gels, hydrogenated styrenic copolymers, hydrogenated styrenic copolymer gels, foamed gels and combinations thereof that provides the desired degree of tackiness.

The skin graft contacting portion of the base layer in absorbent dressing embodiments can have dimensions similar to the stand-alone substrate. For example, the baser layer can have an average thickness between about 50 microns and about 10 millimeters, preferably in some cases, between about 500 microns (μm) and about 1000 microns (μm). The skin graft contacting portion of the base layer should also be flexible enough to conform to the shape of the harvester and/or the recipient site. For example, the skin graft contacting portion of the base layer can have a stiffness between about 5 Shore OO and about 80 Shore OO.

The base layer in absorbent dressing embodiments can include a plurality of openings to provide passageways for fluid transport from the recipient site to the absorbent material. The openings (e.g., pores) can be spaced apart from each other. In certain embodiments, the openings are generally circular. The openings can have an average cross-sectional dimension ranging from about 0.1 nanometers to about 1 millimeter, or preferably an average cross-sectional dimension ranging from about 1 nanometer to about 100 micrometers. In other embodiments, the pores can be elongated or grid-like and their minor dimension can range from about 0.1 nanometers to about 1 millimeter, or preferably from about 1 nanometer to about 100 micrometers.

The base layer in absorbent dressing embodiments can be patterned to define a plurality of skin graft capture sites and the base layer further includes a network of pores disposed between at least some of the capture sites. Again, the pores (disposed between capture sites) can be circular or elongated and have an average cross-section dimension (or a minor dimension, in the case of elongated pores) ranging from about 0.1 nanometers to about 1 millimeter, or preferably ranging from about 1 nanometers to about 100 micrometers.

The absorbent dressing component can also include at least one wicking layer disposed in the enclosure and adapted to distribute fluid to the absorbent material. For example, the substrate can include at least a first wicking layer disposed in the enclosure between the base layer and the absorbent material. Alternatively, or in addition to the first wicking layer, the substrate can include one or more additional wicking layers (e.g., a second wicking layer) disposed in the enclosure between the absorbent material and the sealing member. In certain embodiments, the first and/or second wicking layer can have a grain structure adapted to wick fluid along a surface of the wicking layer.

The absorbent material can further include a plurality of absorbent layers, and one or more of the additional absorbent layers can be positioned in fluid communication between a first wicking layer and a second wicking layer. The dressing can also include at least one intermediate wicking layer disposed in fluid communication between the absorbent layers. In certain embodiments, a peripheral portion of a first wicking layer can be coupled to a peripheral portion of a second wicking layer to provide a wicking layer enclosure surrounding the absorbent layer between the first and the second wicking layers.

In another embodiment of the invention, the absorbent material can include a hydrophilic material that is adapted to absorb fluid and the cap (or sealing) member can be liquid impermeable. For example, the sealing member can include a water-impermeable polyurethane component. In yet another embodiment of the invention, the dressing can further include at least one port for coupling to the reduced pressure source to extract accumulated fluids from the recipient site. The port can further include a valve, e.g., a check valve or one-way valve, to prevent backflow of extracted fluids. The port can further include a conduit providing fluid communication between the absorbent material or at least one wicking layer within the chamber and an external fluid receptacle.

The dressing can include at least one removable backing for handling the substrate prior to positioning it in a skin graft harvester. The substrate can further include another removable backing for handling the dressing prior to positioning it at a recipient site. For example, the substrate can include at least a first removable backing associated with the base layer for handling the substrate prior to positioning it in a skin graft harvester and a second removable backing for handling the dressing and an associated skin graft prior to positioning it at a recipient site.

In another aspect, a system is provided for draining a skin transplantation site including a substrate or dressing and a reduced-pressure source. The substrate or dressing is adapted to provide reduced pressure and/or to store fluid extracted from the site. The substrate or dressing includes a soft-tack base layer, an adhesive, a sealing member, a first wicking layer, a second wicking layer, an absorbent layer, and a conduit interface. The base layer has a periphery surrounding a central portion and a plurality of apertures disposed through the periphery and the central portion. The central portion of the base layer is adapted to be positioned proximate the transplantation site and the periphery of the base layer is adapted to be positioned proximate the tissue surrounding the transplantation site. Further, the periphery of the base layer is adapted to surround the transplantation site, and the apertures in the base layer are adapted to be in fluid communication with site and the tissue surrounding the transplantation site. (A two-part lower backing can also be employed such that a first (inner) portion of the lower backing is removed when the substrate is joined to a skin graft harvester and a second outer portion of the backing subsequently removed to facilitate peripheral adhesion at the

transplantation site.) The sealing member has a periphery and a central portion, the periphery of the sealing member being positioned proximate the periphery of the base layer such that the central portion of the sealing member and the central portion of the base layer define an enclosure. The first wicking layer and the second wicking layer are each disposed in the enclosure. The absorbent layer is positioned in fluid communication between the first wicking layer and the second wicking layer. The conduit interface is positioned proximate to the sealing member and in fluid communication with the dressing. The reduced-pressure source is adapted to be coupled in fluid communication with the conduit interface to provide reduced pressure to the dressing.

In another aspect of the invention, methods are disclosed for fluid management during skin transplantation. The methods can include the steps of contacting at least one skin graft with an absorbent substrate, the substrate comprising a soft-tack base layer having a surface adapted to contact and engage at least one excised skin graft and a sealing member peripherally joined to the base layer and defining an enclosure therebetween; and an absorbent material disposed within the enclosure; deploying the substrate at a recipient site such that a skin graft that is engaged by the base layer contacts the recipient site; and maintaining the substrate in contact with the recipient site to facilitate transplantation of the graft and removal of fluids.

In another aspect, the methods of the present invention can include maintaining the absorbent substrate at the recipient site, and further, removing excess fluids at the recipient site by extraction into the absorbent material of the substrate. The methods can be practiced by providing a plurality of pores in the soft-tack base layer to provide a fluid communication path between a recipient site and the absorbent material within the substrate and, optionally, deploying at least one wicking layer within the substrate to distribute fluids captured from a recipient site to different regions of the absorbent material.

In certain embodiments, the methods can further include a step of coupling the substrate to a reduced pressure source to facilitate fluid extraction and, optionally, draining accumulated fluids from the absorbent material into a fluid extraction receptacle or deploying a one-way valve between the absorbent material and the fluid extraction receptacle.

Other aspects, features, and advantages of the illustrative embodiments will become apparent with reference to the drawings and detailed description that follow.

BRIEF DESCRIPTION OF THE DRAWINGS

A more complete understanding of this specification may be obtained by reference to the following detailed description when taken in conjunction with the accompanying drawings wherein:

FIG. **1** is a schematic, perspective view of an illustrative embodiment of a soft-tack porous substrate for skin graft harvesting;

FIG. **1**A is a more detailed schematic view of a portion of the soft-tack substrate of FIG. **1**;

FIG. **2** is a schematic, side view of the substrate of FIG. **1** with protective upper and lower cover layers;

FIG. **3** is a perspective exploded view of the product of FIG. **2**

FIG. **4** is an enlarged partial cross-section view of the product of FIG. **3**

FIG. **5** shows a schematic diagram of the apparatus used for the loop tack measurement test.

FIG. **6**A is a partial cross-sectional view of an absorbent, soft-tack dressing according to the invention;

FIG. **6**B is a schematic, side view of an alternative embodiment of an absorbent substrate according to the invention having a port for coupling to a reduced pressure source or external fluid drainage receptacle;

FIG. **7** is a schematic, perspective top view of a skin graft harvester for use with the soft-tack substrate;

FIG. **8** is a schematic, perspective top view of the skin graft harvester of FIG. **7** with the head component removed and the cutter mechanism exposed; and

FIG. **9** is a schematic, perspective top view of the skin graft harvester of FIG. **7** with a soft-tack substrate according to the invention deployed in the harvester to capture skin grafts.

DETAILED DESCRIPTION

In the following detailed description of non-limiting, illustrative embodiments, reference is made to the accompanying drawings that form a part hereof. Other embodiments may be utilized and logical, structural, mechanical, electrical, and chemical changes may be made without departing from the scope of this specification. To avoid detail not necessary to enable those skilled in the art to practice the embodiments described herein, the description may omit certain information known to those skilled in the art. The following detailed description is not to be taken in a limiting sense, with the scope of the illustrative embodiments being defined by the appended claims.

The terms "micrograft" and "microdome" are used interchangeably herein and are intended to encompass skin grafts that have a width or length less than a millimeter, more preferably, less than 100 microns. A micrograft or microdome is an excised skin segment having at least one dimension parallel to the skin surface that is less than a millimeter, preferably less than 100 micrometers, more preferably in some applications less than 10 micrometers. The minimum width or length is preferably less than 500 micrometers, preferably less than 100 micrometers or less than 50 micrometers or less than 10 micrometers or less than 1 micrometer. For example, a micrograft or microdome can be generally circular, oval or oblong in a plane parallel to the skin surface and have a diameter or major axis that ranges from about 1 millimeter to 0.01 micrometers, or from about 100 micrometers to about 0.1 micrometers, or more preferably from about 50 to 1 micrometers. Micrografts and microdomes also typically have a depth dimension that extends at least through the epidermis and preferably in some applications encompasses at least one layer of basal cells. The depth can range from about 500 micrometers to about 0.1 micrometers, preferably from about 100 micrometers to about 1 micrometer.

The term "harvesting" as used herein is intended to encompass the removal of one or more skin grafts from an skin graft generating device, such as, for example, a suction blister micrograft generator, as well as the transplantation of such skin grafts and any intermediate steps, such as culturing, expanding, stretching, treating or otherwise preparing a skin graft for transfer to a recipient site.

The terms "substrate" and "dressing" are used interchangeably throughout the specification. The term "dressing" is typically used when the substrate is used not only to capture excised skin grafts but also to retain them for transplantation. During the transplantation the substrate (or dressing) with its captured grafts can be applied directly to a recipient site. Both substrates and dressings can also

encompass other elements in addition to a soft-tack, porous surface, e.g., fluid absorbent layers or cap layers.

The terms "porous" as used herein is intended to encompass not only apertures or holes but also permeable and open cell structures, generally. The terms "generally circular" and "circular" are used interchangeably herein to describe openings that are round, oval or otherwise form closed polygonal shapes having a major dimension (width or diameter) that is less than 5 times the minor dimension (width or diameter) of the shape. Preferably the major dimension is less than 3 times, or less than 2 times, the minor dimension. In certain embodiments, a permeable or porous composition can be formed from woven or non-woven (e.g., matted) fibers. The fibrous base layer can include microfibers and/or nanofibers. In certain embodiments, microfibers having an average diameter of about 0.1 to about 10 micrometers can be desired. In other embodiments, nanofibers having an average diameter of about 1 to about 100 nanometers, preferably about 20 to about 80 nanometers, although in some instances, fibers with diameters about 1 to about 20 nanometers, can also be advantageous.

The term "about," as used herein, refers to variations in a numerical quantity that can occur, for example, through measuring or handling procedures in the real world; through inadvertent error in these procedures; through differences in the manufacture, source, or purity of compositions or reagents; and the like. Typically, the term "about" as used herein means greater or lesser than the value or range of values stated by 1/10 of the stated values, e.g., ±10%. For instance, a concentration value of about 30% can mean a concentration between 27% and 33%. The term "about" also refers to variations that would be recognized by one skilled in the art as being equivalent so long as such variations do not encompass known values practiced by the prior art. Each value or range of values preceded by the term "about" is also intended to encompass the embodiment of the stated absolute value or range of values. Whether or not modified by the term "about," quantitative values recited in the claims include equivalents to the recited values, e.g., variations in the numerical quantity of such values that can occur, but would be recognized to be equivalents by a person skilled in the art.

The terms "soft-tack" and "tacky" as used herein refers to the ability of a surface to bind to other surfaces or objects in a more releasable and gentler manner than conventional adhesives. The degree of tackiness can be measured by the loop tack test (described below) and a soft tack coating or composition would typically measure greater than 0.3N. For example soft tack materials suitable for use in the present invention can range from 0.4 to about 2N, more suitable in some instances from about 0.5 to about 1.5N according to the loop tack test.

The soft-tack substrate, in certain embodiments, is preferably a soft material suitable for both capturing micrografts and providing a fluid seal with the skin graft transplantation site as described herein. For example, the substrate can comprise a silicone gel, a soft silicone, hydrocolloid, hydrogel, polyurethane gel, polyolefin gel, hydrogenated styrenic copolymer gels, a foamed gel, a soft closed cell foam such as polyurethanes and polyolefins, polyurethane, polyolefin, or hydrogenated styrenic copolymers coated with an adhesive described below. The substrate can have a thickness between about 500 microns (μm) and about 1000 microns (μm). In one embodiment, the substrate has a stiffness between about 5 Shore OO and about 80 Shore OO. The substrate can include hydrophobic or hydrophilic materials.

In some embodiments, the substrate may be a hydrophobic-coated material. For example, the substrate can be formed by coating a mesh or porous material, such as, for example, woven, nonwoven, molded, or extruded mesh with a hydrophobic material. The hydrophobic material for the coating may be a soft silicone, for example. Factors that may be utilized to control the ability of the substrate to capture skin grafts can include the diameter and number of the pores in the substrate, the thickness of the substrate, and the tackiness of the substrate.

Referring to the drawings, FIGS. **1** and **1**A depict an embodiment of a soft-tack substrate **10**, viewed from the bottom, showing a soft-tack composition **12** having a lower surface **11** and a removable peripheral covering **13** for an optional peripheral adhesive element (e.g., for use when applying the substrate to a recipient site). The surface **11** provides a plurality of sites for capturing skin grafts. FIG. **1**A is an expanded view of a portion of FIG. **1**, showing an embodiment of the soft-tack composition. The soft-tack composition can also be porous and in this illustrated embodiment a plurality of pores **18** are disposed between the graft capture sites. In this embodiment, the substrate is formed of silicone-coated fibers **11** (described in more detail below). The pores **18** can be generally circular or elongated in one or more dimensions. Regardless of the shape or size of the pores **18**, the porosity of the substrate **10** should be sufficient to permit fluid migration from a skin segment through the soft-tack surface **11**.

FIG. **2** is a side view of the substrate **10**, showing the soft-tack composition **12**, optional peripheral adhesive composition **14**, and the first (bottom) and second (top) removable backings **15** and **17**, respectively.

Referring to FIGS. **3** and **4**, a product according to the invention can comprise a substrate **12**, e.g., of cellulose acetate gauze **2**, having upper and lower surfaces **4**,**5** coated with a hydrophobic, tacky, crosslinked silicone gel **9**. The silicone composition penetrates the gauze substrate to form a single, chemically homogeneous silicone phase on the upper and lower surfaces. The coated substrate **12** has an array of apertures extending through the substrate and the silicone to allow passage of wound fluid through the material. In some embodiments, the tackiness of the coated upper surface **4** can be approximately 50% greater than the tackiness of the coated lower surface **5**, as determined by the loop tack test described below. The nominal weight of the gauze **2** can be, for example, 100 grams per square meter and the nominal total coating weight of the silicone can be 120-130 grams per square meter.

Identical release-coated cover sheets **15**, **17** can be applied to the upper and lower silicone-coated surfaces **4**, **5**. In use, the lower release sheet **8** is removed first to expose the less tacky lower surface **5** of the substrate **12**. It is relatively easy to selectively remove the lower release sheet **15** because of the lower adherence of this sheet to the material compared to the upper release sheet **17**. The lower and/or upper release sheets may further comprise indicia to identify the release sheet to be removed first. The lower surface **5** may then be applied to a skin graft harvester bed, followed by removal of the upper release sheet **7** at the time of removal from the harvester or transplantation (or at the time of application of optional secondary dressing elements such as an absorbent layer, if desired).

Further details on manufacturing techniques for making soft-tack porous substrates can be found in U.S. Patent Application Pub. No. 2013/0165837 by Systagenix Would Management IP Co. BV entitled "Silicone Gel-Coated

Wound Dressings," published Jun. 27, 2013, herein incorporated in its entirety by reference.

The tackiness of the silicone coatings produced by the methods of the invention can be measured in a tensile tester, such as an Instron tester, using the set-up shown in FIG. **5**. Samples of silicone coated gauze were cut to dimensions 5.times.9.5 cm. Margins of 1 cm were marked out along the long edges by drawing straight lines 1 cm from the long edges. The sheet of coated gauze **1130** was looped around and the 1 cm margins **132**, **134** on opposed edges of one surface (opposite the surface being measured) were applied firmly to opposite sides of a 2 mm thick metal spacer bar **138**. Strips of polypropylene film 1 cm wide **140**, **142** were then applied to the opposite surfaces of the coated gauze opposite the spacer bar **138** to prevent the coated gauze from adhering to the jaws of the measurement device.

The assembly of polypropylene strips, coated gauze and spacer bar was then gripped in the jaws **144** of the Instron tester. The loop of coated gauze **130** having the surface under test outermost was then lowered onto a clean polycarbonate surface **146** of dimensions 15.5 cm.times.3.8 cm so that the loop adheres to the surface, and raised to detach the loop from the surface. Lowering and raising are performed at 300 mm/min, and the minimum distance between the jaws **44** and the polycarbonate surface **46** is 15 mm. The measured tack (in Newtons) is the maximum force measured while detaching the loop from the surface.

FIG. **6**A is a partial cross-sectional view of an absorbent dressing incorporating a soft-tack, porous composition according to the invention. Soft-tack base layer **16** and sealing member **20** define an enclosure for an absorbent material **24**. The figure also schematically shows a plurality of micrografts **4** carried on a bottom surface (e.g., a skin-contacting surface) of the base layer **12**. A plurality of pores **18** in the base layer permit fluid ingress and provide passageways to the absorbent material **24**. Optionally, one or more wicking layers can be utilized to distribute captured fluids to different portions of the absorbent material. In the illustrated embodiment, a first wicking layer **26** is disposed in proximity to the base layer and a second wicking layer **28** is disposed in proximity to the sealing member **28**. Alternatively, wicking material can form alternating layers with absorbent material layers (sandwich style) or wicking material can be distributed throughout or otherwise dispersed within the absorbent material. In the illustrated embodiment, the first and second wicking layers **26**, **28**, respectively, can be joined together at the periphery to form a seal **30** that completely or substantially encloses the absorbent material.

Additionally, FIG. **6**A shows the substrate **12** in use as part of dressing **10**A applied to a skin graft transplantation site on a surface of a patient's skin **2** in need of grafting. On the bottom surface of the base layer **12** are a plurality of captured skin grafts **3**, which are placed in contact with the skin **2** as the substrate **10** is applied. Fluid migration from the transplant site and extraction into the absorbent material **24** is illustrated by the dotted lines.

FIG. **6**B shows another embodiment of an absorbent substrate, having the soft-tack porous substrate **12**, sealing member **20** and a port **40** for coupling to a source of negative pressure **46** and/or a fluid extraction receptacle **48**. The port **40** can further include a conduit **42**, one or more filters **47** and/or a check valve **44** to permit fluid extraction (and, optionally, one-way flow) from the absorbent material, e.g., in instances where the absorbent material reaches or nears a saturated state to an external fluid receptacle or a waste disposal site.

Continuing with FIGS. **6**A-B, the sealing member **20** has a periphery and a central portion. The periphery of the sealing member **20** may be positioned proximate the periphery of the base layer **12** such that the central portion of the sealing member **20** and the central portion of the base layer **12** define an enclosure.

The sealing member **20** may cover the tissue site **6** to provide a fluid seal and a sealed space between the tissue site **6** and the sealing member **20** of the substrate **10**. Further, the sealing member **20** may cover tissue, such as a portion of the epidermis **106**, surrounding the tissue site **6** to provide the fluid seal.

The sealing member **20** may be formed from any material that allows for a fluid seal. A fluid seal is a seal adequate to maintain reduced pressure at a desired site given the particular reduced pressure source or system involved. The sealing member **20** may comprise, for example, one or more of the following materials: hydrophilic polyurethane; cellulosics; hydrophilic polyamides; polyvinyl alcohol; polyvinyl pyrrolidone; hydrophilic acrylics; hydrophilic silicone elastomers; an INSPIRE 2301 material from Expopack Advanced Coatings of Wrexham, United Kingdom having, for example, an moisture vapor transmission rate (MVTR) (inverted cup technique) of 14400 g/m^2/24 hours and a thickness of about 30 microns; a thin, uncoated polymer drape; natural rubbers; polyisoprene; styrene butadiene rubber; chloroprene rubber; polybutadiene; nitrile rubber; butyl rubber; ethylene propylene rubber; ethylene propylene diene monomer; chlorosulfonated polyethylene; polysulfide rubber; polyurethane (PU); EVA film; co-polyester; silicones; a silicone drape; a 3M Tegaderm® drape; a polyurethane (PU) drape such as one available from Avery Dennison Corporation of Pasadena, Calif.; polyether block polyamide copolymer (PEBAX), for example, from Arkema, France; or other appropriate material.

The sealing member **20** may allow vapor to exit while inhibiting liquids from exiting the sealed space provided by the substrate **10**. The sealing member **20** may be a flexible, breathable film having a high MVTR of, for example, at least about 300 g/m^2 per 24 hours. The sealing member **20** may comprise a range of medically suitable films having a thickness between about 15 microns (μm) to about 50 microns (μm). In other embodiments, a low or no vapor transfer drape can be used as the sealing member.

The fluid management assembly may be disposed in the enclosure **31** and may include a first wicking layer **26**, a second wicking layer **28**, and an absorbent layer **24**. The absorbent layer **24** may be positioned in fluid communication between the first wicking layer **26** and the second wicking layer **28**. The first wicking layer **26** may have a grain structure (not shown) adapted to wick fluid along a surface of the first wicking layer **26**. Similarly, the second wicking layer **28** may have a grain structure (not shown) adapted to wick fluid along a surface of the second wicking layer **28**. For example, the first and the second wicking layer **26**, **28** may wick or otherwise transport fluid in a lateral direction along the surfaces of the first and the second wicking layer **26**, **28**, respectively. The surfaces of the first and the second wicking layer **26**, **28** may be normal relative to the thickness of each of the first and the second wicking layer **26**, **28**. The wicking of fluid along the first and the second wicking layers **26**, **28** may enhance the distribution of the fluid over a surface area of the absorbent layer **24** that may increase absorbent efficiency and resist fluid blockages. Fluid blockages may be caused, for example, by fluid pooling in particular location in the absorbent layer **24** rather than being distributed more uniformly across the absorbent

layer **24**. The laminate combination of the first and the second wicking layer **26**, **28** and the absorbent layer **24** may be adapted as described above to maintain an open structure, resistant to blockage, that can maintain fluid communication with, for example, the tissue site **6**.

The dressing **10**A may include, without limitation, any number of wicking layers and absorbent layers as desired for treating a particular tissue site. For example, the absorbent layer **24** may be a plurality of absorbent layers **24** positioned in fluid communication between the first wicking layer **26** and the second wicking layer **28** as described above. Further, at least one intermediate wicking layer may be disposed in fluid communication between the plurality of absorbent layers **24**. Similar to the absorbent layer **24** described above, the plurality of absorbent layers **24** and the at least one intermediate wicking layer may be positioned within the wicking layer enclosure.

In one embodiment, the absorbent material or layer **24** may be a hydrophilic material adapted to absorb fluid from, for example, the tissue site **6**. Materials suitable for the absorbent layer **184** may include Luquafleece® material, Texus FP2326, BASF 402c, Technical Absorbents 2317 available from Technical Absorbents (www.techabsorbents.com), sodium polyacrylate super absorbers, cellulosics (carboxy methyl cellulose and salts such as sodium CMC), or alginates. Materials suitable for the first and second wicking layers **26**, **28** may include any material having a grain structure capable of wicking fluid as described herein, such as, for example, Libeltex TDL2 80 gsm.

The substrate **10**A can be a pre-laminated structure manufactured at a single location or simply individual layers of material stacked upon one another as described above. Individual layers of the substrate **10** may be bonded or otherwise secured to one another without adversely affecting fluid management by, for example, utilizing a solvent or non-solvent adhesive, or by thermal welding.

In one embodiment, the enclosure **31** defined by the base layer **12** and the sealing member **20** may include an anti-microbial layer. The addition of the anti-microbial agent may reduce the probability of excessive bacterial growth within the dressing **10** to permit the dressing **10** to remain in place for an extended period. The anti-microbial material may be, for example, an additional layer included as a part of the substrate **10** as depicted in FIGS. **1-4**, or a coating of an anti-microbial agent disposed in any suitable location within the substrate **10**. The anti-microbial material may include elemental silver or similar compounds, for example.

Referring now to FIG. **6**B, the port **40** for coupling to a source of reduced pressure can be positioned proximate to the sealing member **20** and in fluid communication with the absorbent material **24** through an aperture (not shown) in the sealing member **20** to provide reduced pressure from the reduced-pressure source **46** to the substrate **10**. The port **40** may comprise a medical-grade, soft polymer or other pliable material. As non-limiting examples, the port **40** may be formed from polyurethane, polyethylene, polyvinyl chloride (PVC), fluorosilicone, or ethylene-propylene, etc. In one illustrative, non-limiting embodiment, port **40** may be molded from DEHP-free PVC. The port **40** may be formed in any suitable manner such as by molding, casting, machining, or extruding. Further, the port **40** may be formed as an integral unit or as individual components and may be coupled to the substrate **10** by, for example, adhesive, welding or mechanical coupling.

The port **40** can also include one or more filters **47**, e.g., an odor filter to inhibit the passage of odors from the tissue site **6** out of the sealed substrate **10**, or a hydrophobic filter. The filter **47** can be disposed in the conduit **42** or other suitable location such that fluid communication between the reduced-pressure source **46** and the substrate is provided through the filter **47**. In another embodiment, the filters **47** can be positioned in any exit location in the substrate **10**, such as an aperture (not shown), that is in fluid communication with the atmosphere or with the reduced-pressure source **46**. The filter **47** may also be positioned in any suitable location in the substrate that is in fluid communication with the graft transplantation site **6**.

For example, an odor filter **47** may include a carbon material in the form of a layer or particulate, such as a woven carbon cloth filter such as those manufactured by Chemviron Carbon, Ltd. of Lancashire, United Kingdom (www.chemvironcarbon.com). A hydrophobic filter **47** may be comprised of a material that is liquid impermeable and vapor permeable, such as a material manufactured under the designation MMT-314 by W.L. Gore & Associates, Inc. of Newark, Del., United States, or similar materials.

Continuing with FIG. **6**B, the reduced-pressure source **46** provides reduced pressure to the substrate **10** and the sealed space **31**. The reduced-pressure source **46** may be any suitable device for providing reduced pressure as described herein, such as, for example, a vacuum pump, wall suction, or other source. Additional details on reduced pressure sources can be found, for example, in U.S. patent application Ser. No. 11/646,918 filed Dec. 28, 2006, U.S. patent application Ser. No. 11/810,027 filed Jun. 4, 2007; U.S. patent application Ser. No. 12/661,293 filed Mar. 15, 2010; and U.S. patent application Ser. No. 13/052,873 filed Mar. 21, 2011. The disclosures of each of these patent applications are incorporated by reference in their entireties.

As used herein, "reduced pressure" generally refers to a pressure less than the ambient pressure at a tissue site being subjected to treatment. Typically, this reduced pressure will be less than the atmospheric pressure. The reduced pressure may also be less than a hydrostatic pressure at a tissue site. Unless otherwise indicated, values of pressure stated herein are gauge pressures. While the amount and nature of reduced pressure applied to a tissue site will typically vary according to the application, the reduced pressure will typically be between −5 mmHg and −500 mmHg, and more typically in a therapeutic range between −100 mmHg and −200 mmHg.

The reduced pressure delivered may be constant or varied (e.g., patterned or random) and may be delivered continuously or intermittently. Although the terms "vacuum" and "negative pressure" may be used to describe the pressure applied to the tissue site, the actual pressure applied to the tissue site may be more than the pressure normally associated with a complete vacuum. Consistent with the use herein, an increase in reduced pressure or vacuum pressure typically refers to a relative reduction in absolute pressure. An increase in reduced pressure corresponds to a reduction in pressure (more negative relative to ambient pressure) and a decrease in reduced pressure corresponds to an increase in pressure (less negative relative to ambient pressure).

A conduit **42** having an internal lumen may be coupled in fluid communication between the reduced-pressure source **46** and the substrate **10**. The conduit interface **43** may be coupled in fluid communication with the dressing and adapted to connect between the conduit **42** and the substrate **10** for providing fluid communication with the reduced-pressure source **46**. The conduit interface **43** may be fluidly coupled to the conduit **42** in any suitable manner, such as, for example, by an adhesive, solvent or non-solvent bonding, welding, or interference fit. An aperture (not shown) in the sealing member **20** may provide fluid communication

between the substrate and the conduit interface **43**. In one embodiment, the conduit **42** may be inserted into the substrate **10** through an aperture (not shown) in the sealing member **20** to provide fluid communication with the reduced-pressure source **46** without utilization of the conduit interface **43**. The reduced-pressure source **46** may also be directly coupled in fluid communication with the substrate **10** and/or the sealing member **20**. The conduit **42** may be, for example, a flexible polymer tube. A distal end of the conduit **42** may include any one of known couplings for attachment to the reduced-pressure source **46**.

FIG. **7** is a schematic view of a skin graft harvester **50** for use with a soft-tack substrate in accordance with various aspects of the present invention. In this illustrative embodiment, the harvest **50** includes a detachable head portion **52** and harvester body **54**. The harvester body **54** is adapted for placement on a patient's skin at a donor site where skin grafts are to be obtained, e.g., on the inner thigh, and secured in place, for example, with strap **56** (shown in phantom). The head **52** can further include a heater (not shown) powered via a coupler **60** adapted to couple with a power source in a base unit (not shown). The head **52** further includes a seal **63** which permits a reduced pressure chamber to be formed when the head **52** and body **54** are joined together and the harvester **50** is coupled to a vacuum pump or other source of reduced pressure, e.g., via coupler **60** connecting the harvester **50** to its base unit. The head **52** can further include one or more windows **58** for observation of skin blisters being formed within the chamber by application of reduced pressure, heat or both. Once the blisters have been formed, the head **52** can be removed, e.g., by deactivating the source of reduced pressure and by actuation of release levers **62**, which break the seal **63** and allow the head **52** to be lifted off the harvester body **54**.

Additional details on harvesters useful in connection with the present invention can be found in U.S. patent application Ser. No. 13/839,518 filed Mar. 15, 2013; U.S. patent application Ser. No. 13/346,329 filed Jan. 9, 2012; U.S. patent application Ser. No. 13/436,318 also filed Jan. 9, 2012; U.S. patent application Ser. No. 13/014,737 filed Jan. 27, 2011; U.S. patent application Ser. No. 12/851,656 filed Aug. 6, 2010; U.S. patent application Ser. No. 12/851,621 filed Aug. 6, 2010; U.S. patent application Ser. No. 12/851,703 filed Aug. 6, 2010; and U.S. patent application Ser. No. 12/851,682 filed Aug. 6, 2010. The contents of each of the above-referenced related applications are herein incorporated by reference in their entireties.

FIG. **8** is a schematic view of the skin graft harvester **50** of FIG. **7** with the head **52** removed and the cutting mechanism **74** exposed. The harvester body **54** can include a base portion **70**, a sled **72**, and actuator handle **80**. The cutting mechanism **74** can include a plurality of plates with initially aligned holes through which skin blisters are drawn by heat and/or application of suction when the head **52** is joined to the harvester body **54** and activated. Once the blisters are formed, they can be cleaved by the cutting mechanism **74**. For example, below the top plate depicted in FIG. **8**, one or more additional plates, e.g., a cutter plate and a bottom plate can be deployed with aligned holes. By actuation (e.g., pulling up) of handle **80**, the sled **72** is caused to move horizontally such that one of the plates below the top plate, e.g., the "cutter plate" (not shown) also moves (because of its linkage to the sled **72**), thereby occluding the alignment of holes **78** and cleaving the raised blisters from the donor's skin.

FIG. **9** is a schematic view of the skin graft harvester **50** of FIG. **7** with a soft-tack substrate **10** according to the invention deployed in the harvester body **54** to capture skin grafts. In the illustrated embodiment, the user (e.g., clinician) places the substrate **10** in the harvester holding the backing **22** with the upper cover sheet (or upper sealing member **20**) upwards and the lower soft-tack surface (not visible) in contact with the top plate of cutter mechanism (as shown in FIG. **8**). By so placing the substrate, the lower soft-tack surface will also come into contact with the skin blisters. In one preferred embodiment, the substrate is so situated before the cutter mechanism is actuated to cleave the blisters into skin grafts (as described above). In other embodiments, the substrate can be placed onto the harvester after cleavage to capture grafts that have already been cleaved from the skin. In either event the substrate can then be removed from the harvester body **54** and applied to a recipient site, as illustrated in FIGS. **1-6**.

Although this specification discloses advantages in the context of certain illustrative, non-limiting embodiments, various changes, substitutions, permutations, and alterations may be made without departing from the scope of the specification as defined by the appended claims. Further, any feature described in connection with any one embodiment may also be applicable to any other embodiment

What is claimed is:

1. An apparatus comprising:

a substrate formed from a fibrous material comprising an upper surface, and a lower surface configured for placement on an excised skin graft at a donor site, the upper and lower surfaces coated with a silicone composition to form a homogeneous silicone phase, and the lower surface comprising a plurality of skin graft capture sites disposed thereon, the plurality of skin graft capture sites being configured to contact the excised skin graft and capture the excised skin graft for removal from the donor site, wherein the silicone phase on the upper surface and lower surface are configured such that the upper surface comprises a tackiness of approximately 50% greater than tackiness of the lower surface;

a plurality of pores extending through the substrate and the silicone phase and configured to allow passage of fluids therethrough;

a peripheral adhesive composition disposed outwardly from a lateral border of the substrate and having an upper surface and a lower surface;

a first removeable backing sheet covering the lower surface of the substrate and the lower surface of the peripheral adhesive composition, and a second removable backing sheet covering the upper surface of the substrate and the upper surface of the peripheral adhesive composition;

a skin graft harvestor having a body portion and a detachable head portion, the body portion having an opening for placement around the skin graft capture sites,

wherein the substrate is positionable over the opening, and a border region of the lower surface is releasably adherable to the body portion about the opening for capturing the excised skin graft;

wherein the excised skin graft is adherable to the substrate by the lesser tackiness of the lower surface.

2. The apparatus of claim **1**, wherein the silicone phase comprises an average thickness between about 500 microns (μm) and about 1000 microns (μm).

3. The apparatus of claim **1**, wherein the fibrous material comprises a plurality of microfibers having an average diameter of about 0.1 to about 10 micrometers.

4. The apparatus of claim 1, wherein the fibrous material comprises a plurality of nanofibers having an average diameter of about 1 to about 100 nanometers.

5. The apparatus of claim 1, wherein the fibrous material comprises a plurality of nanofibers having an average diameter of about 20 to about 80 nanometers.

6. The apparatus of claim 1, wherein the plurality of pores comprise an average cross-section dimension ranging from about 1 nanometer to about 1 millimeter.

7. The apparatus of claim 6, wherein the plurality of pores comprise an average cross-section dimension ranging from about 1 nanometer to about 100 micrometers.

8. The substrate of claim 1, further comprising at least one port for coupling to a reduced pressure source and wherein the at least one port comprises a valve.

9. The substrate of claim 8, wherein the port further comprises a conduit configured to provide fluid communication between the absorbent material or at least one wicking layer within the chamber to an external fluid receptacle.

10. The apparatus of claim 1, wherein the substrate further comprises at least a first removable backing associated with a base layer for handling the substrate prior to positioning in the skin graft harvester and a second removable backing for handling the substrate and the skin graft prior to positioning at a recipient site.

11. The apparatus of claim 1, wherein the dressing further comprises an absorbent material.

12. The apparatus of claim 11, wherein the absorbent material comprises an open cell foamed polymer.

13. The apparatus of claim 11, wherein the absorbent material comprises a plurality of pores each having an average cross-section dimension ranging from about 0.05 millimeters to about 5 millimeters.

14. The apparatus of claim 11, wherein the absorbent material comprises a plurality of pores each having an average cross-section dimension ranging from about 0.1 millimeters to about 1 millimeters.

15. The apparatus of claim 11, wherein the absorbent material is selected from group comprising silicones, silicone gels, soft silicones, hydrocolloids, hydrogels, polyurethanes, polyurethane gels, polyolefins, polyolefin gels, hydrogenated styrenic copolymers, hydrogenated styrenic copolymer gels, foamed gels and combinations thereof.

16. The apparatus of claim 1, wherein the silicone phase comprises a degree of tackiness in a range of about 0.4N to about 2N.

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